APPARATUS AND METHOD FOR IMPROVING THERMAL ENERGY TRANSFER

TECHNOLOGICAL FIELD

[0001] Embodiments of the present invention relate to an apparatus and method for providing improved thermal energy transfer. In particular, they relate to a housing and a thermally conductive material that is inserted into the housing and can improve the thermal energy transfer between a component within the housing and the housing or a surface external to the housing.

BACKGROUND

[0002] Apparatus such as a conductive housing may prevent leakage of electromagnetic signals from electronic components. Conductive housings which prevent leakage of electromagnetic signals are commonly known as shielding cans. Electronic devices such as televisions or portable devices may need to shield one or a plurality of sensitive components in one or more shielding cans but with processing speeds of integrated circuits increasing, the heat being radiated from integrated circuits is also increasing. The integrated circuits must be kept as cool as possible in order to operate efficiently and at as high a processing speed as possible which means transferring heat away from the integrated circuit as efficiently as possible would be desirable despite being surrounded by a housing or a conductive housing.

BRIEF SUMMARY

[0003] According to various, but not necessarily all, examples of the disclosure there may be provided an apparatus comprising; a circuit board, a housing connected to the circuit board, at least one electronic component contained within said housing, said housing comprising a aperture, wherein said housing is configured to receive a thermally conductive material through the aperture and said thermally conductive material couples thermal energy from said at least one electronic component.

[0004] In some examples the thermally conductive material extends through the aperture and is configured to be adhered to a surface external to the housing.

[0005] In some examples the surface is at least one of: a conductive housing, a battery or a shield for a display.

[0006] In some examples the thermally conductive material comprises a gasket that is configured to be compressed in said housing.

[0007] In some examples the thermally conductive material comprises a flexible film.

[0008] In some examples the conductive housing comprises a second aperture through which the flexible film is configured to be pulled.

[0009] In some examples the second aperture comprises an edge configured to cut the flexible film.

[0010] In some examples the thermally conductive material comprises a gasket and a graphite layer.

[0011] According to various, but not necessarily all, examples of the disclosure there may be provided a method for providing thermal energy transfer in an apparatus comprising; partially enclosing at least one electronic component in a conductive housing; and inserting a thermally conductive material into a aperture of said housing; and coupling the thermally conductive material to the electronic component.

[0012] In some examples the method further comprises inserting a flexible film that is attached to the thermally conductive material through a first and second aperture to create a pulling force to insert the thermally conductive material through said first slot.

[0013] In some examples the flexible film is attached to a first and second surface of the thermally conductive material.

[0014] In some examples the thermally conductive material is adhered to a surface external to the conductive housing.

[0015] According to various, but not necessarily all, examples of the disclosure there is provided an apparatus comprising; a circuit board, a housing connected to the circuit board, at least one electronic component contained within said conductive housing, a thermally conductive material extending from within the and through an aperture in said housing.

[0016] According to various, but not necessarily all, examples of the disclosure there may be provided a thermal conductive material comprising a substantially planar first and second surface comprising a graphite layer a compressible gasket and a flexible layer, said flexible layer configured to be inserted into a conductive housing and adhered to a surface external to the conductive housing.

[0017] In some examples the flexible layer is attached to the first and second surface.

[0018] In some examples the thermally conductive material comprises a copper layer and the flexible film covers at least a portion of the copper layer

[0019] In some examples the thermally conductive material comprises a removable film.

[0020] In some examples the thermally conductive material may be adhered to a surface external to the conductive housing once the removable film is removed.

[0021] In some examples the flexible film may be perforated to assist in at least its partial removal from the thermally conductive material.

BRIEF DESCRIPTION

[0022] For a better understanding of various examples that are useful for understanding the detailed description, reference will now be made by way of example only to the accompanying drawings in which:

[0023] FIG. **1** illustrates a printed circuit board with a shielded housing;

[0024] FIGS. **2***a*-**2***b* illustrate a housing according to an exemplary embodiment of the invention;

[0025] FIG. **3** illustrates a housing according to another exemplary embodiment of the invention;

[0026] FIGS. **4***a*-**4***b* illustrate a thermally conductive material;

[0027] FIGS. **5***a*-**5***b* illustrate a thermally conductive material partially contained within a housing;

[0028] FIG. **6** illustrates a printed circuit board with a plurality of housings and the thermally conductive layer; and

[0029] FIG. **7** illustrate a flow diagram for providing improved thermal energy transfer;

DETAILED DESCRIPTION

[0030] FIG. **1** schematically illustrates a prior art example of a printed circuit board **100** comprising a first housing **110** and a second housing **120** connected to a first major surface **130** of the printed circuit board **100**. The first housing **110** and second housing **120** are conductive shielding cans that inhibit